

COHESIVE SEDIMENT TRANSPORT RESEARCH: THE SCIENCE OF MUD

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Mud in the natural environment is a mixture of clays, silt, sand, water and organic matter. It can be found in large quantities in estuaries and along neighbouring coasts, as is the case for Belgium. The usually high content of fine-grained particles (clays and some silts) explain the cohesive nature of mud, which is the net result of electrostatic forces from the clay particles and the sticky organic substances produced by bacteria and other micro-benthos. Therefore, cohesive particles consist of flocs of aggregates of the primary particles, which structure and density are determined not only by the internal properties, but also by those of the ambient water and the external mechanic forces (especially turbulent shear and particle interactions). When cohesive particles settle, they form a layer of slowly consolidating fluid mud. The siltation of navigation channels, docks and aquaculture farms is a well known problem. Managing authorities rely on model predictions in order to estimate the related economic cost and environmental impact of cohesive sediment transport and the effects of human interference by dredging and the construction of structures. However, the accuracy of these models is very low. The Hydraulics Laboratory of the KU Leuven investigates possibilities to improve the modelling capacities of presently used engineering software for sediment transport. The present focus of the research is on fluid-particle interactions, high-concentration effects, mud-wave interaction, flocculation and bottom erosion resistance. The model improvements are strongly physically-based and supported by experimental data.